(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 940 352 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.09.1999 Bulletin 1999/36

(21) Application number: **99301726.8**

(22) Date of filing: **08.03.1999**

(51) Int Cl.[6]: **B65D 81/18**, B65D 5/66, B65D 5/48, B65D 5/56, B65D 5/50

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **06.03.1998 GB 9804883**
10.03.1998 GB 9805135

(71) Applicant: **Glasay International plc**
London NM10 6DP (GB)

(72) Inventor: **Ostro, Maurice Samuel**
London NW3 3DR (GB)

(74) Representative: **Godwin, Edgar James**
MARKS & CLERK,
57-60 Lincoln's Inn Fields
London WC2A 3LS (GB)

(54) Box for products to be kept cold

(57) A portable box defining a space for containing a product, e.g. a frozen or chilled foodstuff, includes an internal compartment (19) for accommodating a cooling means, e.g. dry ice. A lid (16) allows a consumer access to the box. A partition (18) prevents contact between the product (or the consumer's hand) and the cooling means and permits heat transfer by convection. The box is constructed of poorly conductive sheet material (cardboard) and heat entering any side of the box preferably has to pass through at least two thicknesses of the sheet material.

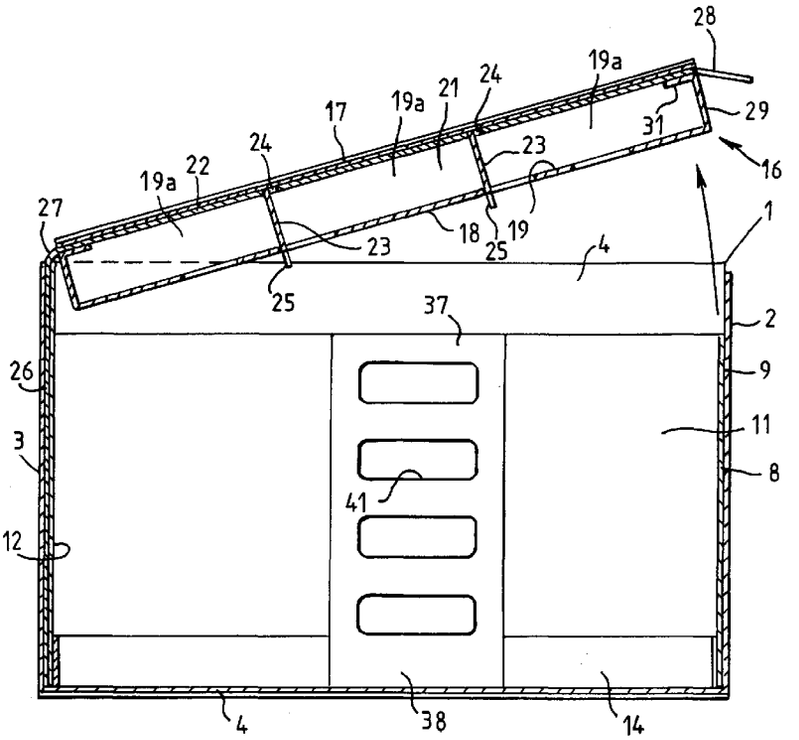

Fig. 2

EP 0 940 352 A2

Description

[0001] This invention relates in general to boxes and in particular to portable boxes defining a space for containing a product.

[0002] Foodstuffs to be consumed in passenger aircraft are carried onto the aircraft in boxes contained in metal canisters which are stacked in the aircraft and which have front openings from which the boxes can be removed.

[0003] In the case of frozen foods such as ice creams, frozen yoghurts, and other frozen desserts, the box is usually made of foamed plastics material such as polystyrene, and packets of solid carbon dioxide (known as dry ice) are placed inside the box with the product. Such boxes are expensive. Although they are re-usable, they are quite easily damaged during use. Furthermore, since they are generally useful for other purposes, they are often not re-used for the intended purpose. The packets of solid carbon dioxide come into contact with the product, adversely affecting its texture, and they can also cause injury to the hands of anyone removing the product from the box.

[0004] Thus there is a need for a box in which a product can be kept cold and from which consumers of the product can safely help themselves. Conventional cardboard boxes are not suitable for this purpose.

[0005] It is conventional for food producers to pack foodstuffs (such as frozen foods, chilled foods, perishable foods, and foods prepared ready for cooking) in thermally insulated containers which are transported to locations of use or retail sale, where the foodstuffs are unloaded from the containers and temporarily stored in suitable storage means such as freezers or refrigerators. The thermally insulated containers, which are expensive and easily damaged, are then returned to the producer.

[0006] Foodstuffs supplied in this way to temporary or mobile outlets such as outdoor events, large-scale indoor events, hot dog stalls, ice cream vendors, and galleys on aircraft or trains, for example, are transferred to refrigerated storage or to ovens (e.g. microwave ovens) as appropriate. The handling involved introduces the risk of contaminating the foodstuff or not keeping it at the required temperature.

[0007] What is desired is a container in which a food product which is to be served chilled or frozen or which is to be heated and served hot can be supplied by the producer, temporarily stored, and made available to the user of the product.

[0008] The present invention provides a box defining a space for containing a product, the box including an internal compartment for accommodating a cooling means, the compartment being separated from the space by a partition which substantially prevents the cooling means from coming into contact with the product and the user's hands and through which heat transfer between the product and the cooling means can take place.

[0009] In a preferred embodiment the invention provides a portable box having an upper side, a lower side, and peripheral sides extending between the upper and lower sides, the said sides defining an enclosed volume and being constructed from poorly conductive sheet material, preferably cardboard. Heat entering each said side has to pass through at least two thicknesses of the said sheet material. A substantially horizontal partition, which is constructed of the said sheet material, is spaced from the upper side, extends between the peripheral sides, and divides the volume into a shallow upper compartment for containing a cooling means, preferably packets of dry ice, and a deep lower space for containing a product to be carried in the box, the partition substantially preventing contact between the product and the cooling means and having apertures permitting cold air or gas to fall from the upper compartment into the lower space.

[0010] Preferably, the box contains spacers for spacing the product away from the sides of the box so as to create convection paths. The box preferably contains dividers for creating convection paths between adjacent product items.

[0011] Preferred and optional features are set forth in the sub-claims.

[0012] The invention will be described further, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a box constructed of sheet material, viewed from one end and above, with a lid of the box being open;
Figure 2 is a sectioned side view of the box;
Figure 3 is a plan view of a first component of the box, being an outer body part;
Figure 4 is a part-sectioned side view of the outer body part;
Figure 5 is a plan view of a second component of the box, being an inner body part or liner;
Figure 6 is a side view of the liner;
Figure 7 is an end view of the liner;
Figure 8 is a plan view of a third component of the box, being a peripheral spacer;
Figure 9 is a plan view of the peripheral spacer;
Figure 10 is a side view of a double-walled lid of the box, being a fourth component, with a compartment lining, being a fifth component;
Figure 11 is an underneath view of the lid;
Figure 12 is an end view of a container, being a sixth component of the box;
Figure 13 is a side view of the container;
Figure 14 is a plan view of the container;
Figure 15 is an end view of a modified container; and
Figure 16 is a side view of the modified container.

[0013] The box illustrated has an outer body part 1

constructed from a single blank of sheet material and having front and rear end walls 2,3, side walls 4 which are longer than the end walls, and a base 6 which, by virtue of the overlapping of the sheet material as indicated in Figures 2 and 3, is twice as thick as the end and side walls. A lip 7 of the sheet material extends inwards from the rear end of one side wall 4 and overlaps the inner surface of the rear end wall 3, for a purpose explained below.

[0014] An inner body part or liner 8 constructed from a single blank of sheet material is a sliding fit in the outer part 1 and has a front end wall 9 and side walls 11, which are all of equal height and lower than the corresponding walls 2,4 of the outer part 1, and has a rear end wall 12 substantially equal in height to the outer rear end wall 3 but with a middle recess 12a in its upper edge. In the present embodiment the liner 8 has no base. A lip 13 of the sheet material extends inwards from the rear end of one side wall 11 and overlaps the outer surface of the rear end wall 12, for a purpose explained below.

[0015] An optional peripheral spacer 14 (Figures 8 and 9) of low height, constructed from a single strip blank of sheet material, is a sliding fit in the liner 8 and rests on the base 4 of the outer body part 1. The purpose of the spacer 14 is explained below.

[0016] A lid 16 constructed from a single blank of sheet material has an outer wall 17 and an inner wall 18, between which a compartment 19 is defined, as well as side walls 21 which are a sliding fit between the side walls 4 of the outer body part 1. When the lid 16 closes the box it rests on the upper edges of the front end wall 2 and side walls 11 of the liner 8.

[0017] A compartment lining 22, consisting of a single blank of sheet material, fits in the compartment 19 with its side edges in contact with the side walls 21 and its upper surface in contact with the lower surface of the outer wall 17. Flaps 23 stamped out of the inner wall 18 are bent up and inserted into transversely extending recesses 24 in the lining 22 in order to define sub-compartments 19a. The flaps 23 have extensions 25 for a purpose explained below. The lining 22 has an extension 26 (with an integral hinge 27) which fits between the rear end walls 3 and 12 of the outer and inner body parts 1 and 8 and which is laterally guided by the above-mentioned lips 7 and 13, which also space the end walls 3 and 12 apart.

[0018] The lining 22 extends through the front end of the lid 16 to form a grippable flap 28. The front end is closed by an openable closure flap 29 which is integral with the inner wall 18 and which has a lip 31 which engages frictionally with the lining 22. A similar flap is provided at the opposite end.

[0019] The inner wall 18 of the lid 16 has large apertures 32 spaced along the side edges and therefore adjacent the side walls 11 of the liner 8 of the box. One or more narrower apertures 33 are also provided. There are also apertures 34 and 36 adjacent the front and rear ends respectively. Accordingly, the gas-permeability of the inner wall 18 is at a maximum near the liner 8 (owing to the apertures 32,34,36).

[0020] A container 37, for containing individual packets of food, is constructed from a single blank of sheet material and extends across the interior of the box. There are further containers, arranged side by side. The container 37 has side walls 38 which are spaced from the side walls 11 of the liner 8 in order to provide convection paths. The end walls 38 and side walls 39 have apertures 41 also providing convection paths. The upper end of the container 37 is open. The above-mentioned extensions 25 of the flaps 23 restrict movement of the container 37.

[0021] The application of the above-described box to the transportation and temporary storage of packets of food which has to be kept cold (e.g. frozen food, chilled food, or frozen desserts such as ice cream, ice lollipops, sorbets, and frozen yoghurts) will now be described.

[0022] The producer loads the food packets (which have been cooled to the required temperature for storage) into the containers 37 and loads the containers into the box. The box is then stored under refrigerated conditions, e.g. at -18°C. When the box is subsequently taken out of storage, the lid 16 is loaded with packets of dry ice (solid carbon dioxide) as a cooling agent. For this purpose, with the flaps 23 flush with the inner wall 18 and with the closure flap 29 open, three dry ice packets are loaded into the compartment 19 one by one. After the first has entered the rear sub-compartment 19a, the flap 23 in front of it is raised, and so on. Finally the flap 29 is closed and then the lid 16 is lowered to close the box.

[0023] The dry ice, which is at a temperature of below -78.5°C, cools the air in the compartment 19. The cold air falls over the food packets and also falls down between the liner 8 and the containers 37. The dry ice sublimes at - 78.5°C, extracting heat from the interior of the box and producing cold CO_2 gas which falls through the apertures in the inner wall 18 of the lid, over the food packets and below the liner 8 and the containers 37. The inner wall 18 prevents direct contact between the dry ice packets and the food packets, on the one hand, and a person opening the lid, on the other hand.

[0024] The box is transported to the point of sale or use and is stored there. If the dry ice sublimes completely, the empty packets are removed from the compartment 19 and replaced with new dry ice packets The food packets are removed from the box one by one, by opening the lid 16 and reaching into the box, as they are required by the consumer. The lid falls back to the closed position under its own weight and the weight of the dry ice.

[0025] The sheet material from which the above-described box is made is corrugated cardboard and is therefore of poor thermal conductivity. The outer and inner body parts 1,8 have two corrugated layers alternating with three flat layers, the outer surfaces having a water-resistant coating. The container 37 has a single

corrugated layer between two flat layers, the outer surfaces having a water-resistant coating. The remaining components have a single corrugated layer between two flat layers. These materials provide adequate thermal insulation.

[0026] Various modifications may be made within the scope of the invention. For example, the sheet material of poor thermal conductivity used for constructing the components of the box may be plastics material.

[0027] Figures 15 and 16 show a modified container 37' which has at the bottom corners feet 42 which space the container 37' from the base 6 of the box, from the liner 8, and from an adjacent container, thereby facilitating convective flow around the contents of the container. This renders the peripheral spacer 14 superfluous. To assist heat transfer, further apertures 41' are provided adjacent the bottom of the container 37' in this embodiment.

[0028] Instead of providing the compartment 19 in a lid, the compartment could be provided in a fixed upper wall of the box. The box would then be provided with a lid replacing one of the end walls of the box.

[0029] By inverting the box, so that the compartment is at the bottom, the box could be converted for use for heating its contents. In this case suitable heating means would be inserted into the compartment and the heat would rise by convection. The heating means may comprise an electric heater or a hot-body or a packet containing chemicals which react exothermically, for example.

[0030] Instead of dry ice as the cooling means, packets containing other frozen substances or packets containing chemicals which react endothermically could be used, for example.

[0031] As mentioned above, the box could be used selectively for heating and cooling. For example, a cooked or partially cooked or uncooked foodstuff could be transported and stored in a chilled or frozen condition and then heated or cooked in the box by replacing the cooling means by heating means.

[0032] Poorly conductive sheet material such as cardboard is inexpensive and recyclable. It is easy to print on for marketing purposes. Depending on the average time required to keep a given volume of product frozen, it is possible to compute the amount of dry ice required in the compartment and to select the optimum configuration (size, shape, distribution, etc.) of the apertures in the partition in order to minimise costly dry ice usage. It is easy to form the required apertures in the partition. In particular the partition can include "cut-outs" defined by lines of weakness (e.g. perforated lines as indicated in Figs. 1 and 11), which cut-outs can be selectively removed to form the required apertures. Alternatively or additionally, the compartment may contain a movable sheet having holes which selectively overlap the apertures in the partition in order to adjust their effective area. The movable sheet may be connected with the compartment lining forming the integral hinge for the lid.

Claims

1. A portable box for containing a product to be kept cold, the box comprising a body which is constructed of poorly conductive sheet material, preferably cardboard, and which has one side open, a lid (16) which is constructed of poorly conductive sheet material and which closes the open side, and a perforated partition (18) which is constructed of poorly conductive sheet material and which divides the volume into a compartment (19) for containing a cooling means, preferably packets of dry ice, and a space for containing the product to be carried in the box, the partition (18) substantially preventing the cooling means from coming into contact with the product and the hand of a person reaching into the said space.

2. A box as claimed in claim 1, in which the lid (18) is on top of the body and the compartment (19) is on the underside of the lid.

3. A box as claimed in claim 2, in which the lid (18) is hinged to the body.

4. A box as claimed in any preceding claim, having an upper side, a lower side, and peripheral sides extending between the upper and lower sides, the said sides defining an enclosed volume, the said sheet material being arranged such that heat entering each said side has to pass through at least two thicknesses of the said sheet material, wherein a substantially horizontal partition (18), which is constructed of the said sheet material, is spaced from the upper side, extends between the peripheral sides, and divides the volume into a shallow upper compartment (19) for containing the cooling means, preferably packets of dry ice, and a deep lower space for containing the product to be carried in the box, the partition (18) having apertures (32-36) permitting cold air or gas to fall from the upper compartment (19) into the lower space.

5. A box as claimed in any preceding claim, in which the compartment (19) is divided into sub-compartments (19a).

6. A box as claimed in any preceding claim, in which the compartment (19) has an open end through which the cooling means can be loaded into the compartment.

7. A box as claimed in claim 6, in which the compartment (19) includes at least one element (23) which is movable from a position in which it permits loading of cooling means to a position in which it inhibits movement of the cooling means.

8. A box as claimed in claim 7, in which the said element consists of a flap (23) on the partition (18) insertable into a recess (24) in an opposite wall of the compartment (19).

9. A box as claimed in any preceding claim, in which the said material is cardboard including at least one corrugated layer.

10. A box as claimed in any preceding claim, in which at least the surfaces defining the said space have a substantially liquid-impermeable coating.

11. A box as claimed in any preceding claim, including an outer body part (1) constructed from poorly conductive sheet material and having front and rear walls (2,3), opposed side walls (4), and a base (6), an inner body part (8) constructed from poorly conductive sheet material and having front and rear walls (9,12) and opposed side walls (11), the inner body part (8) being fitted in the outer body part (1), the lid (16) closing the open top of the outer body part (1) and having an upper wall and a lower wall between which the said compartment (19) is defined.

12. A box as claimed in claim 11, in which a lining (22) of poorly conductive sheet material is provided adjacent the upper wall.

13. A box as claimed in claim 12, in which the lining (22) is connected by a hinge to an extension (26) which fits between the inner and outer body parts (1,8).

14. A box as claimed in any preceding claim, in which a base lining of poorly conductive sheet material rests on the base (6) of the body.

15. A box as claimed in any preceding claim, containing at least one container (37;37') for holding the product, the container having apertures (41;41') for creating convection paths.

16. A box as claimed in claim 15, in which the container (37') has external protuberances (42) for creating convection paths.

17. A package comprising a box according to any preceding claim, a product, e.g. a frozen food, in the said lower space, and cooling means, e.g. dry ice, in the said compartment (19).

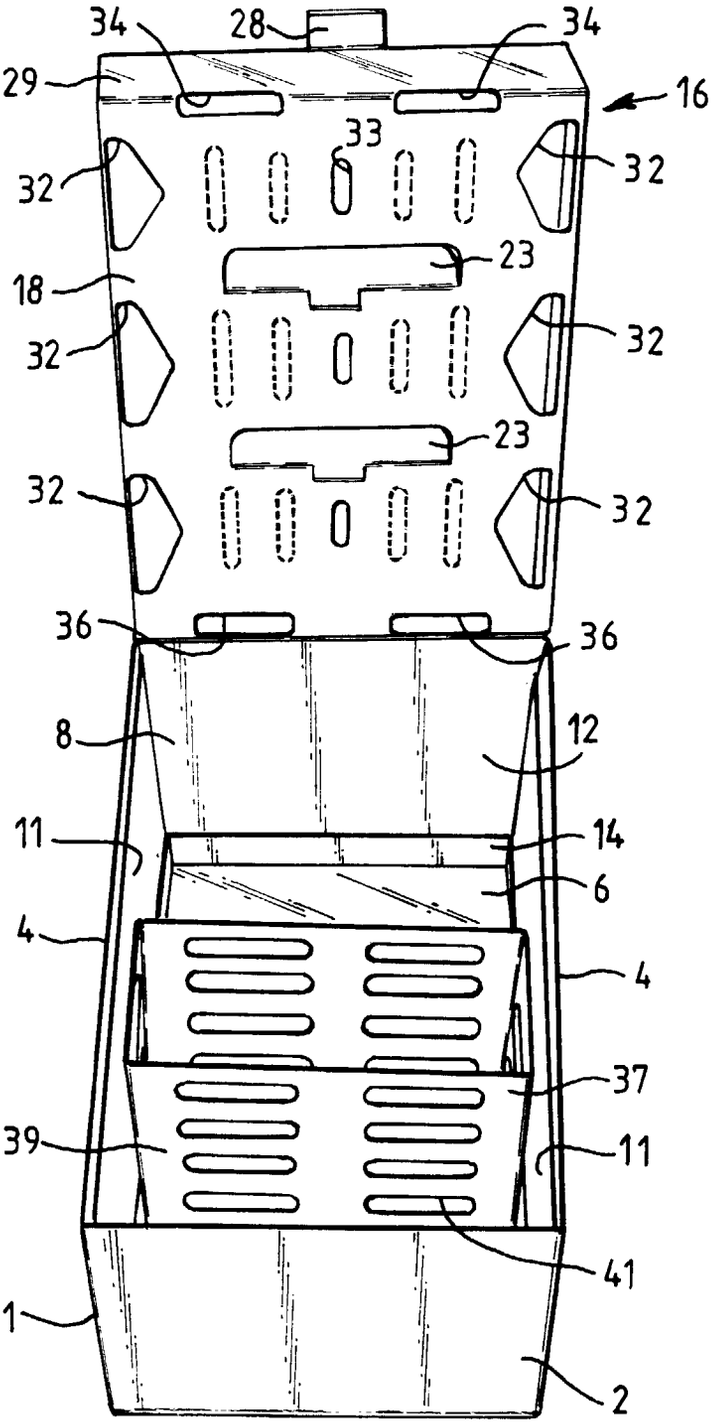
34
28
34
29
16
33
32
32
23
18
32
32
23
32
32
36
36
8
12
11
14
6
4
4
37
39
11
41
1
2

Fig. 1

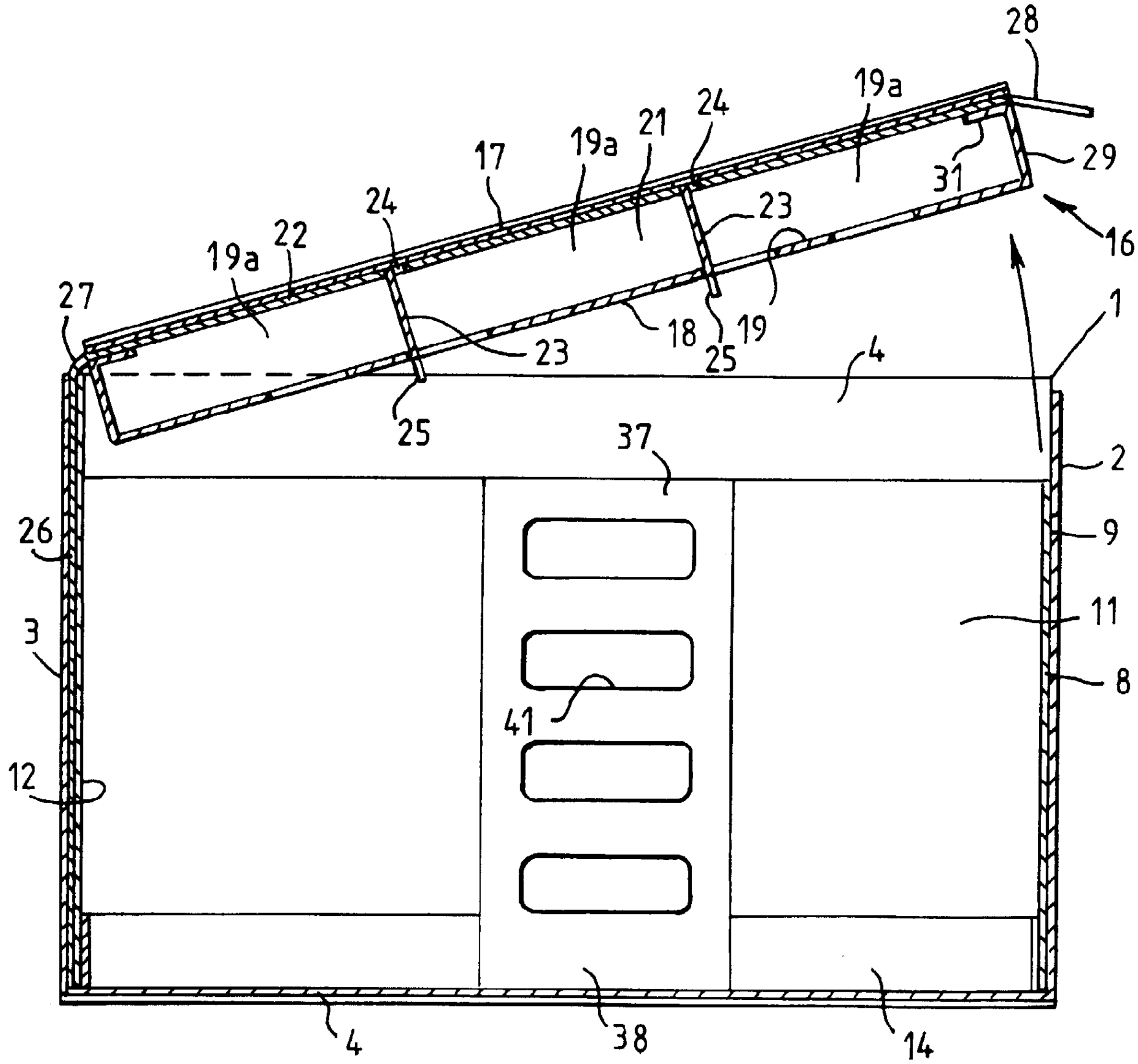
28
19a
24
21
19a
17
24
29
31
23
22
19a
16
27
23
18
19
25
1
4
25
37
2
26
9
11
3
8
41
12
4
38
14

Fig. 2

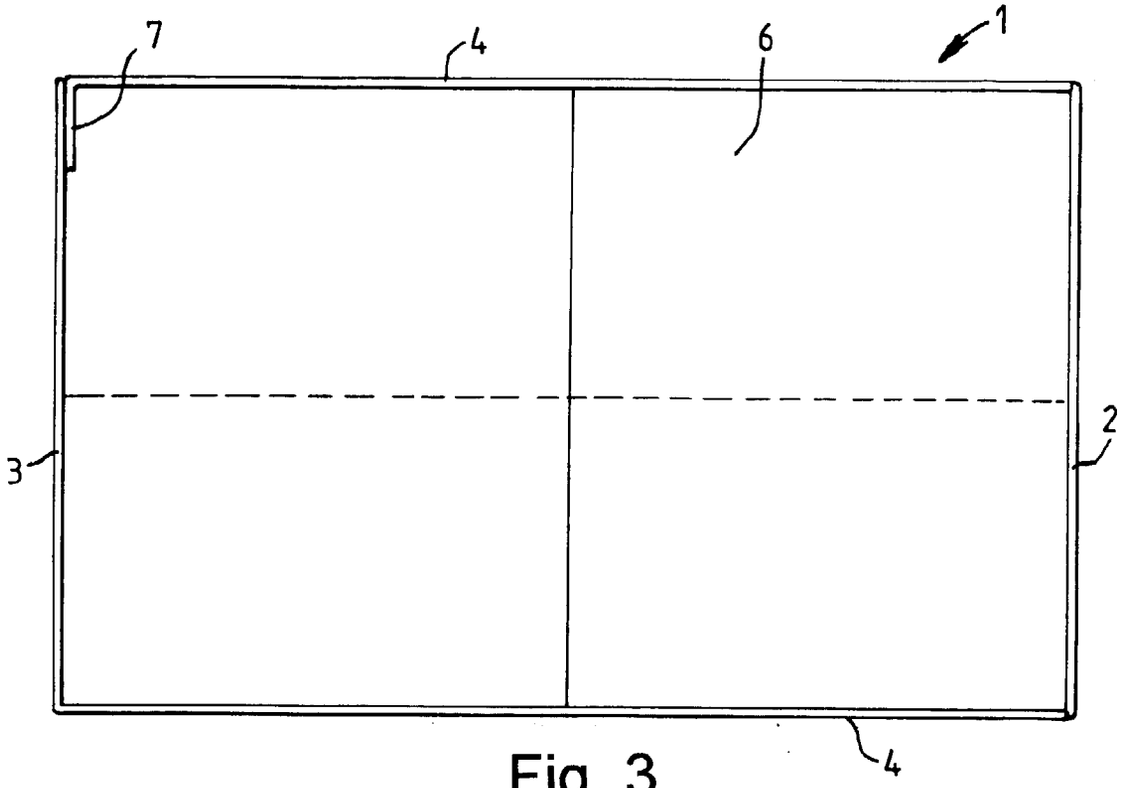

Fig. 3

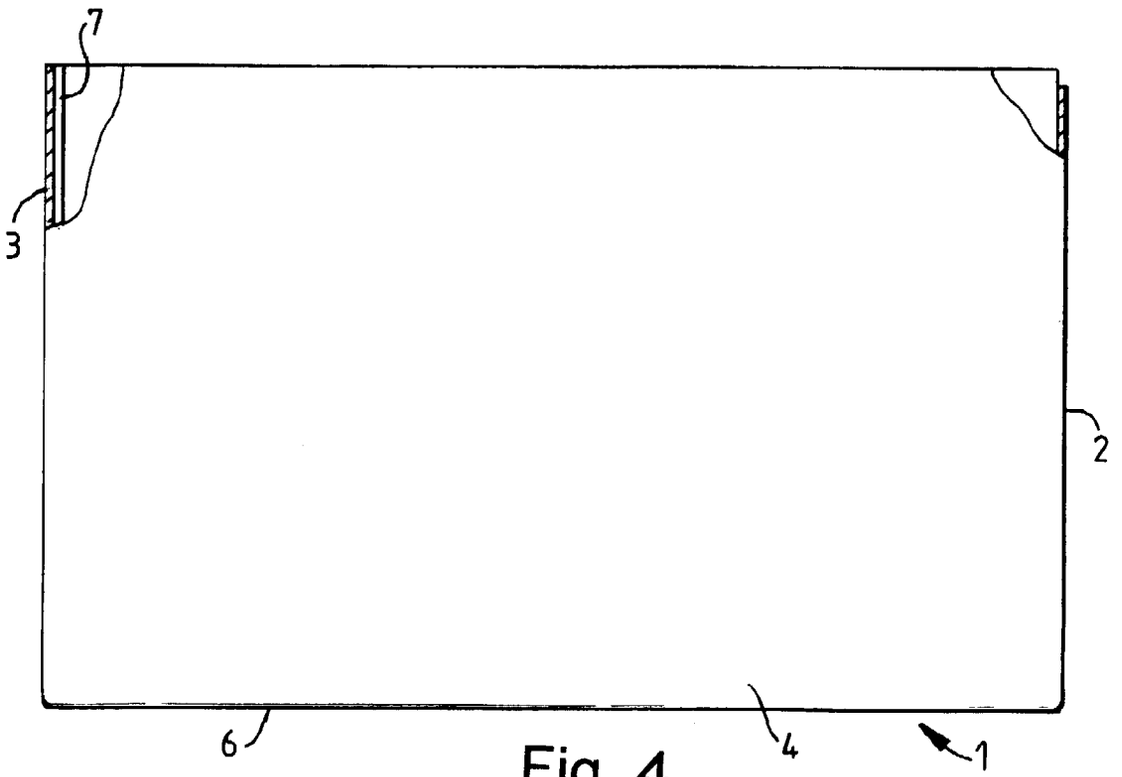

Fig. 4

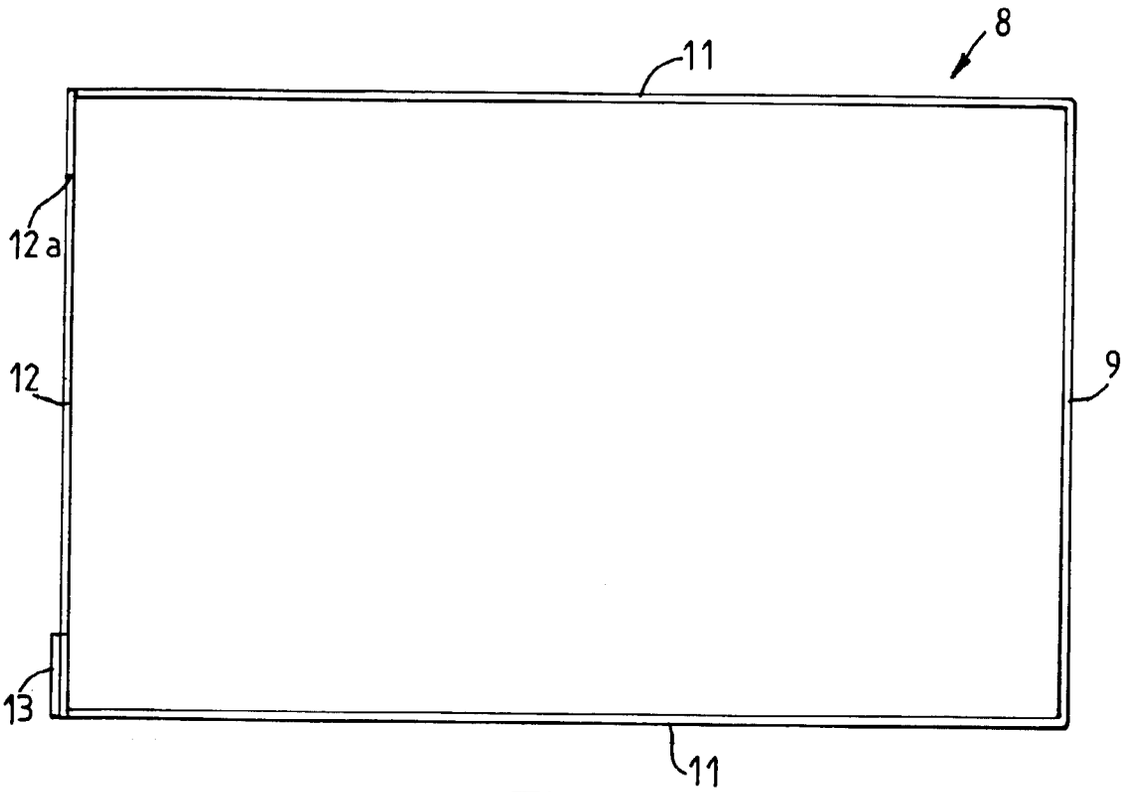

Fig. 5

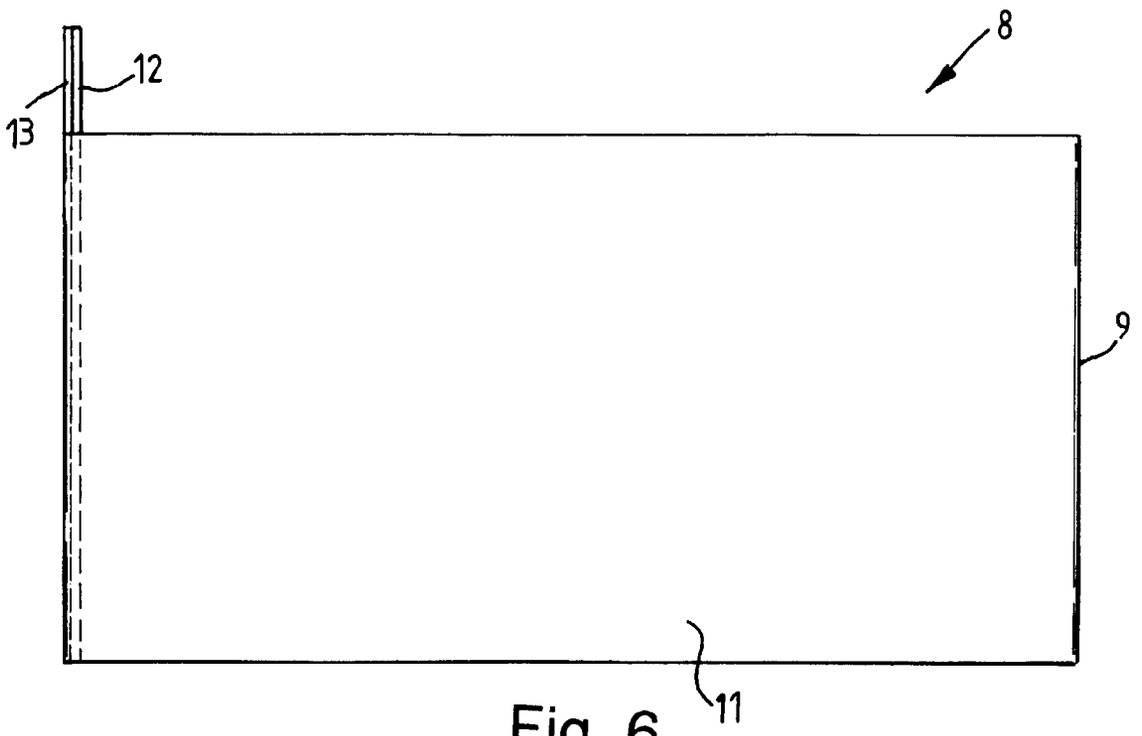

Fig. 6

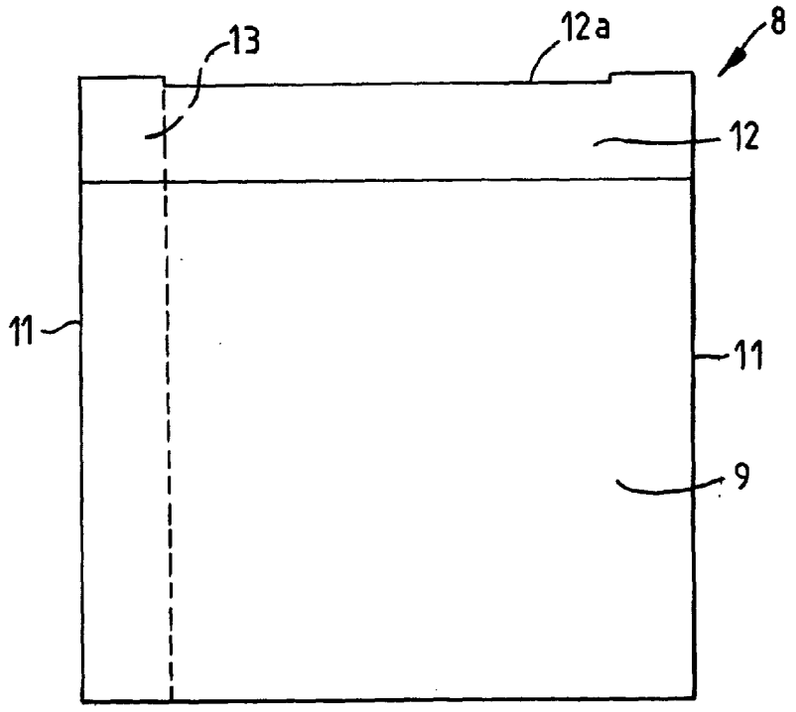

Fig. 7

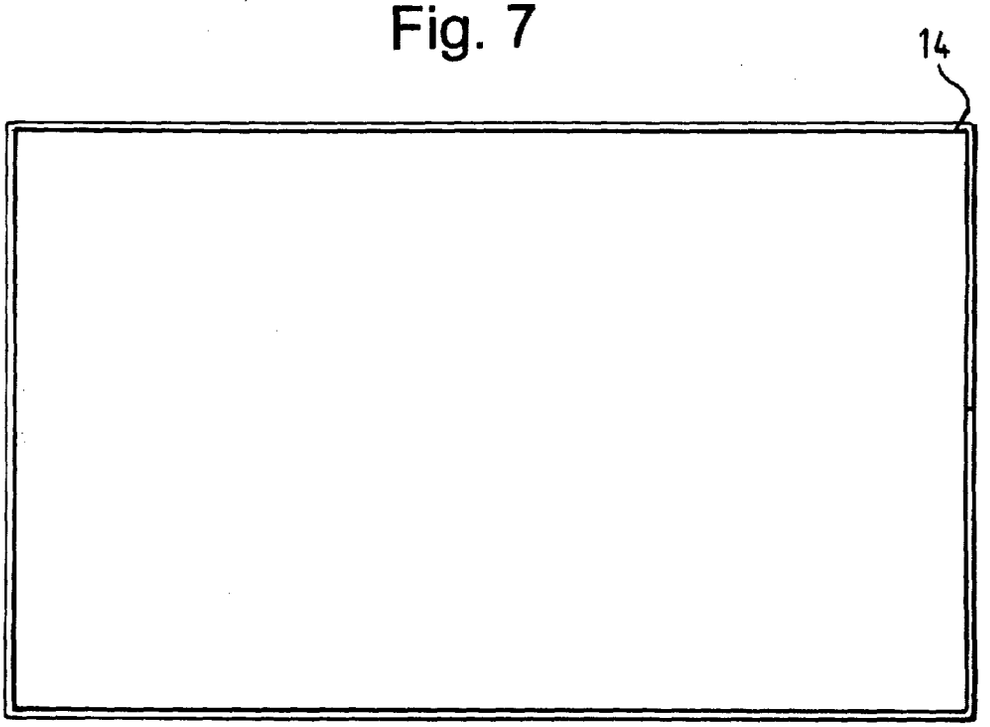

Fig. 8

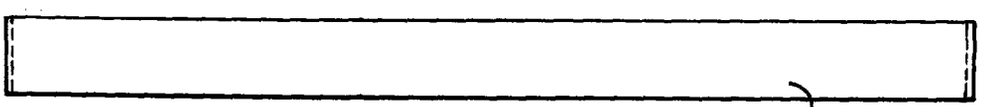

Fig. 9

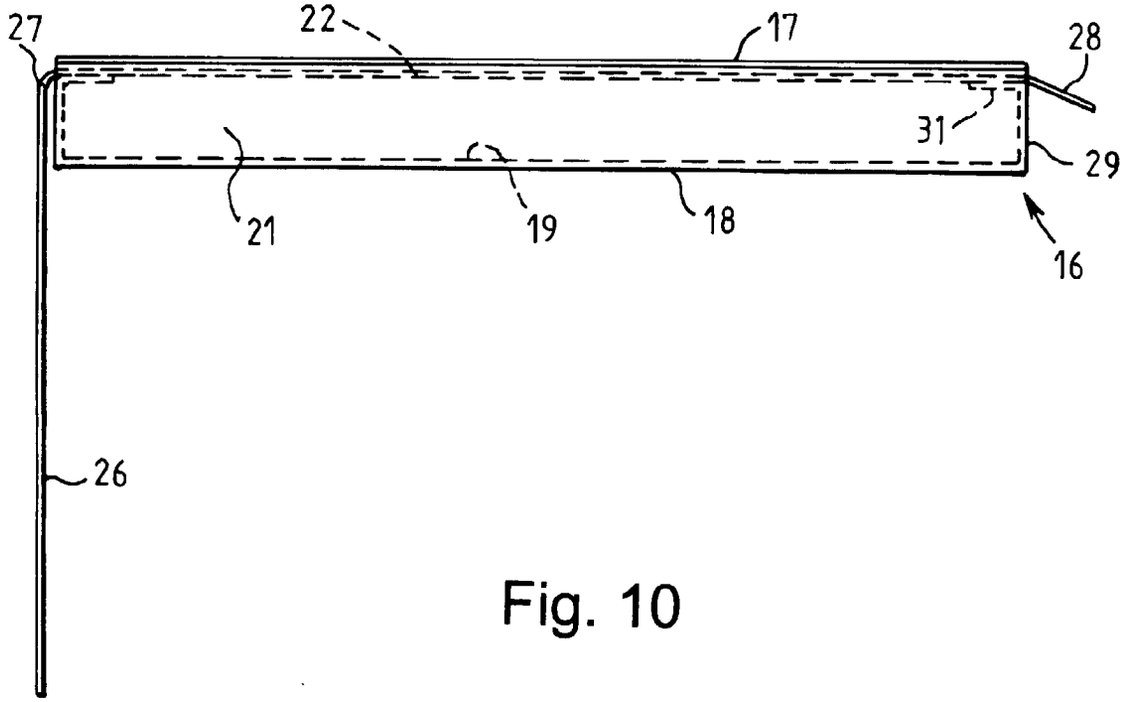
27
22
17
28
31
29
21
19
18
16
26

Fig. 10

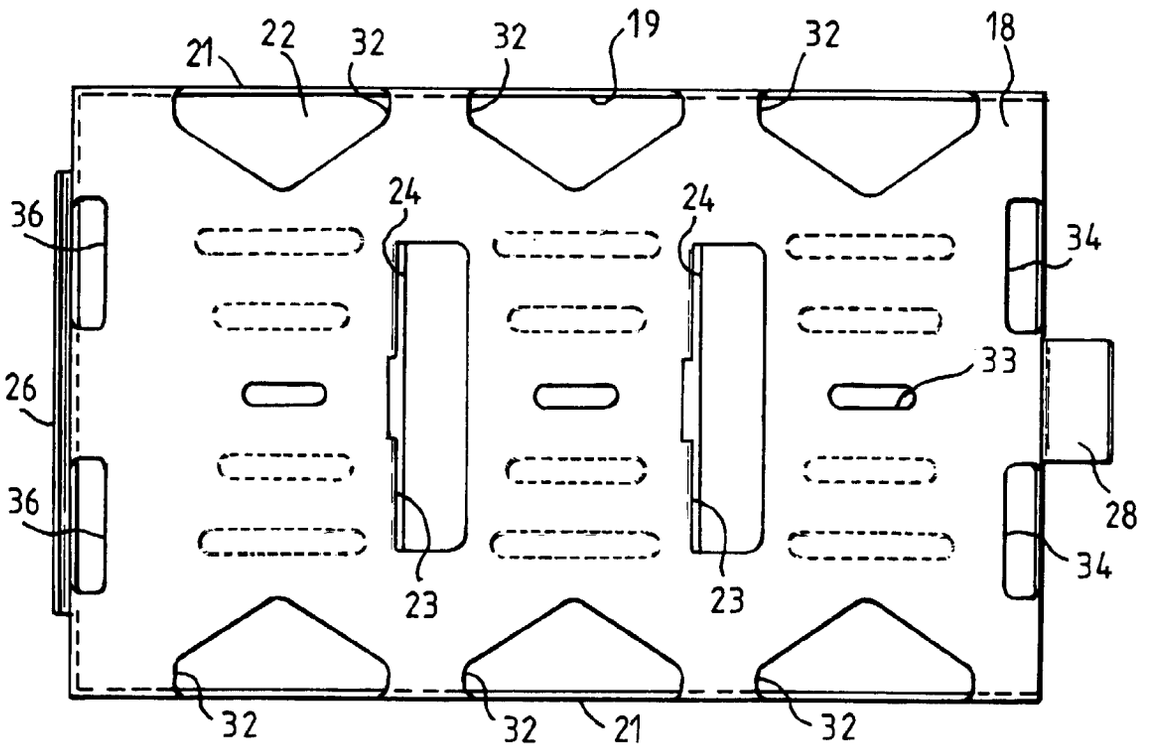
21
22
32
32
19
32
18
24
24
36
34
26
33
36
28
34
23
23
32
32
21
32

Fig.11

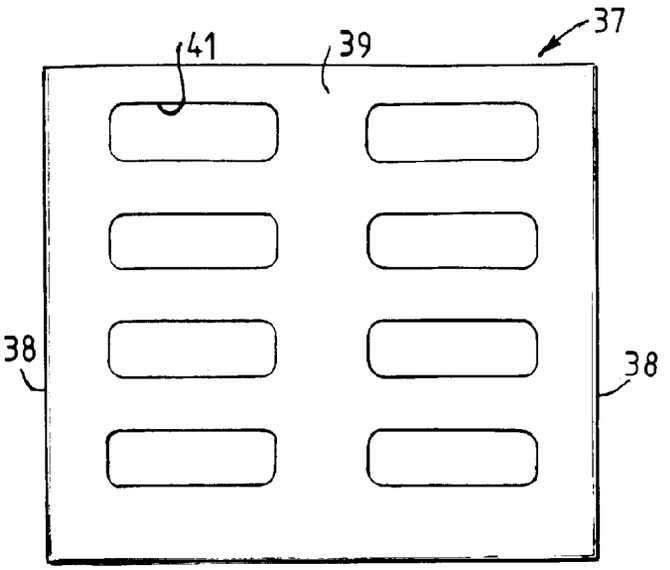

Fig.12

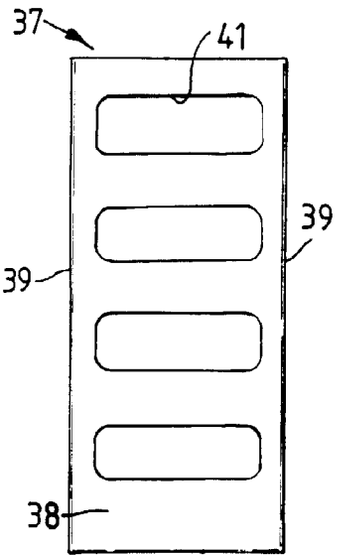

Fig.13

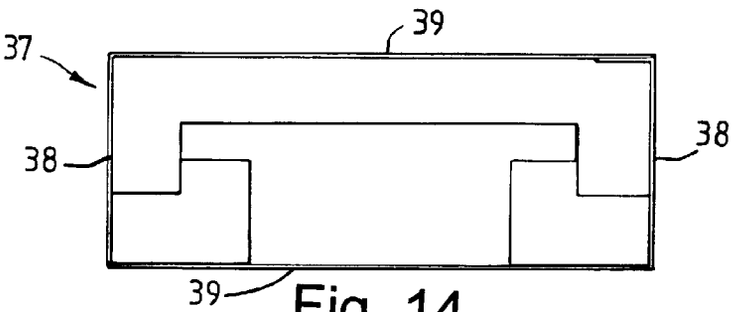

Fig. 14

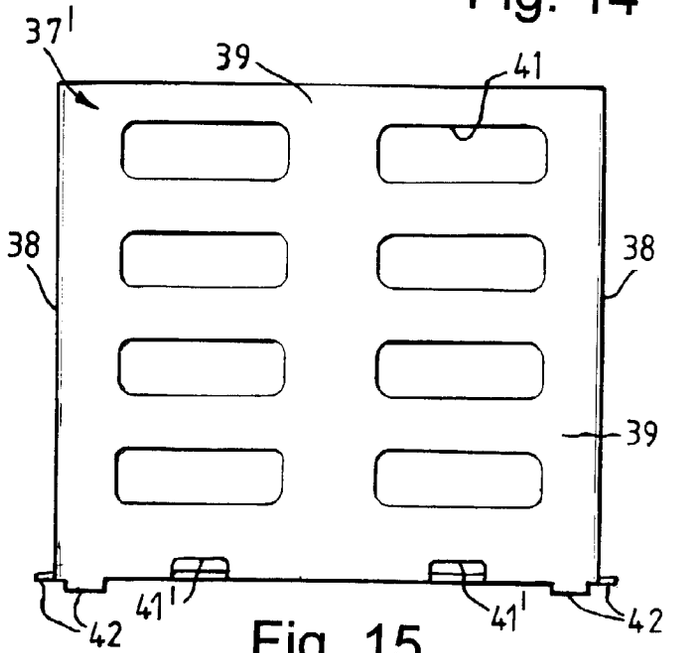

Fig. 15

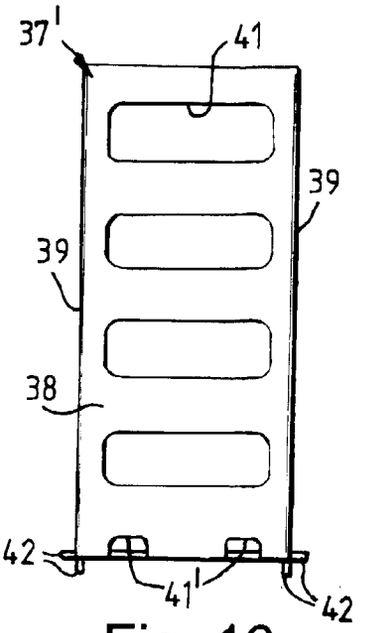

Fig. 16